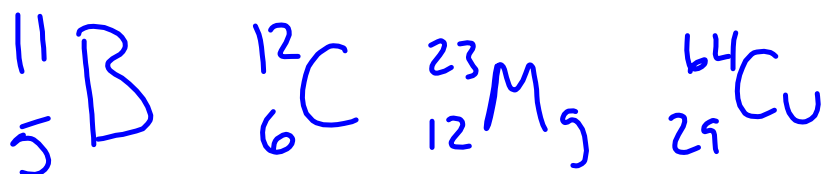
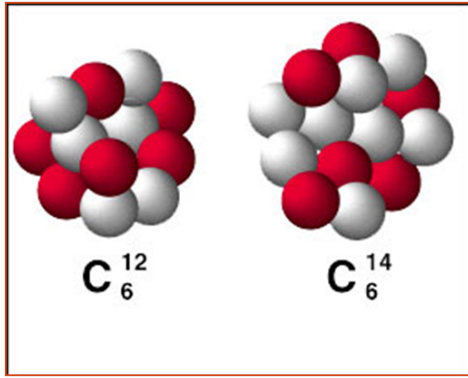


Element	Symbol	Atomic #	Protons	Neutrons	Mass #
Boron-11	B	5	5	6	11
Carbon -12	C	6	6	6	12
Magnesium-23	Mg	12	12	11	23
Copper-64	Cu	29	29	35	64
Calcium-40	Ca	20	20	20	40





Isotopes:
atoms of the same
element with different
numbers of neutrons

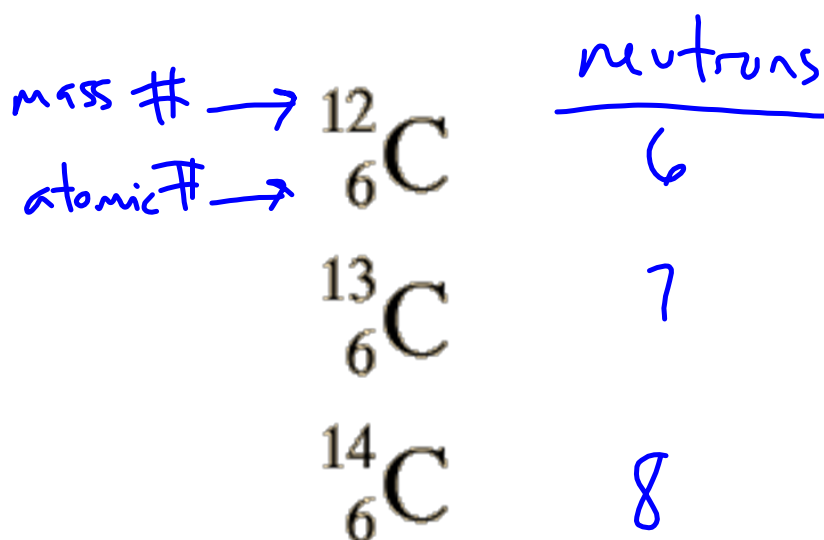
$^{12}_6\text{C}$ $^{14}_6\text{C}$
6 neutrons 8 neutrons

#1	#2	#3	#4
$^{234}_{92}\text{X}$	$^{234}_{93}\text{X}$	$^{235}_{92}\text{X}$	$^{238}_{92}\text{X}$

$^{234}_{92}\text{X}$	$^{234}_{93}\text{X}$	$^{235}_{92}\text{X}$	$^{238}_{92}\text{X}$
↑	Np	↑	↑

Uranium

142 neutrons 143 neutrons 146 neutrons



Naturally occurring nitrogen consists of three isotopes, ^{14}N , ^{15}N , and ^{16}N .

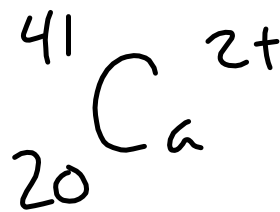
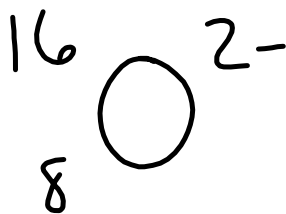
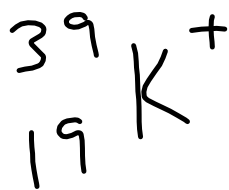
State the number of protons, neutrons, and electrons in each of these carbon atoms.

	^{14}N	^{15}N	^{16}N	} neutral atoms same # of protons as electrons
	7	7	7	
#P	<u>7</u>	<u>7</u>	<u>7</u>	
#N	<u>7</u>	<u>8</u>	<u>9</u>	
#E	<u>7</u>	<u>7</u>	<u>7</u>	

Ions:

- Charged atoms (or groups of atoms) that have a net negative or positive charge
- Ions differ by the number of electrons
- Neutral atoms \rightarrow #protons = #electrons
 - Examples \rightarrow Na, Ca, I, O
- Ions \rightarrow #protons \neq #electrons
 - Examples \rightarrow Na^+ , Ca^{2+} , I^- , O^{2-}
- If you take away an electron, the atom becomes net positive. There are now more protons than electrons.
- If atom is net positive, we call it a cation.
- If an atom gains electrons, it becomes net negative. This means there are more electrons than protons.
- If an atom is ^{net} negative, we call it an anion.

• Examples:



$$\begin{array}{rcl} \# p^+ & 19 & \\ \hline \# n^0 & 20 & \\ \hline \# e^- & 18 & \end{array}$$

$$\begin{array}{rcl} & 8 & \\ \hline & 8 & \\ \hline & 10 & \end{array}$$

$$\begin{array}{rcl} & 20 & \\ \hline & 21 & \\ \hline & 18 & \end{array}$$

